International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

Effects of Aloe Vera on Skin and on Wound Healing - A Review

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Abstract: ***Aloe vera is considered as a natural remedy.The use of aloe vera is being promoted for a large variety of conditions.This review aims to estimate the effect of aloe vera on skin and explore its wound healing properties.Aloe vera is a natural product frequently used for many purposes.The skin plays an important role in protection from external environment.Treatment of wounds is very important and is subject to different investigations. In this regard, a natural substances like Aloe vera may play a crucial role.The use of aloe vera is the upcoming study and has various benefits.***

Keywords: aloe vera, wound healing, skin, growth hormones

1. Introduction

Aloe vera is a succulent plant species of the genus Aloe. It grows wild in tropical climates around the world and is cultivated for agricultural and medicinal uses.Aloe is also used for decorative purposes and grows successfully indoors as a potted plant[1].The Aloe vera plant has been known and used for centuries for its health, beauty, medicinal and skin care properties[2].The leaves are thick and fleshy, green to grey-green, with some varieties showing white flecks on their upper and lower stem surfaces[3].Aloe vera gel contains polysaccharides, amino acids, lipids, plant sterols, tannins, and enzymes,vitamins, minerals, sugars, lignin, saponins, salicylic acids, and 75 other components[4,5]. Aloe vera gel is obtained from the mesophyll and has been used as a herbal medicine.

The skin plays an important role in protection of the body internal environment and it is the largest organ in human's body. Extensive damage to this organ may cause serious problems.Skin is composed of two primary layers, epidermis and dermis that are placed over the subcutaneous connective tissue[3].The epidermis is composed of the outermost layers of the skin. It forms a protective barrier over the body's surface, responsible for keeping water in the body and preventing pathogens from entering, and is a stratified squamous epithelium.The epidermis contains no blood vessels, and cells in the deepest layers are nourished by diffusion from blood capillaries extending to the upper layers of the dermis[25].The dermis is the layer of skin beneath the epidermis that consists of connective tissue and cushions the body from stress and strain. The dermis provides tensile strength and elasticity to the skin through an extracellular matrix composed of collagen fibrils, microfibrils, and elastic fibres, embedded in hyaluronan and proteoglycans[26].The epidermis and dermis are separated by a thin sheet of fibres called the basement membrane, and is made through the action of both tissues. The basement membrane controls the traffic of the cells and molecules between the dermis and epidermis but also serves, through the binding of a variety of cytokines and growth factors, as a reservoir for their controlled release during physiological remodelling or repair processes[27].

Aloe vera is useful in treating wounds and burns, minor skin infections, cysts, diabetes, and elevated blood lipids in humans, and shows some promise in treating more serious and persistent conditions such as eczema, genital herpes, dandruff, psoriasis, canker sores, skin ulcers and others, according to the Mayo Clinic[6]. Other uses include, provide rich nutrient for good health, acts as moisturiser, treats acne, lessens the visibility of stretch marks,soothes in periodontal disease, and also aids in digestion.

The Egyptians used aloe vera plant for treatment of wounds, burns, and infections for the first time. After them, Greeks, Spanish, and African peoples used aloe vera plant by various techniques for several purposes. According to classic medicine in Iran, aloe vera has hot and dry humor and its extract is used for medicinal purpose[3]. Aloe vera gel contains two hormones namely,Auxin and gibberellins that is responsible for providing wound healing and anti-inflammatory properties which reduce skin inflammation.Today, the aloe vera plant is used for various purposes. In this study, the effects of Aloe vera on skin and on wound healing is reviewed.

2. Effect on Skin

Aloe vera gel has been reported to have a protective effect against radiation damage to the skin[7,8]. Exact role is not known, but following the administration of aloe vera gel, an antioxidant protein, metallothionein, is generated in the skin,which scavenges hydroxyl radicals and prevents suppression of superoxide dismutase and glutathione peroxidase in the skin. It reduces the production and release of skin keratinocyte-derived immunosuppressive cytokines such as interleukin-10 (IL-10) and hence prevents UV-induced suppression of delayed type hypersensitivity[9].

Aloe Vera helps in sunburn through its healing activity at the epithelial level of the skin, a layer of cells that cover the body. It acts as a protective layer on the skin. Because of its nutritional qualities and antioxidant properties, the skin heals quicker.Aloe vera moisturises the skin.Gibberellin in aloe vera acts as a growth hormone stimulating the growth of new cells. The growth hormones also add to the healing

properties of the skin with minimal scarring[6].Aloe vera is soothing and can reduce skin inflammations, blistering and itchiness. As ageing occurs,the skin loses its elasticity and there is an appearance of wrinkles in the face. Therefore,Aloe leaves contain a plethora of antioxidants including, beta carotene, vitamin C and E that can help improve the skin's natural firmness and keep the skin hydrated[6]. In case of pregnancy,rapid weight gain or loss the elasticity of the skin gets damaged. To overcome this the aloe vera gel helps to maintain the skin[6].

Various studies have been conducted to examine the benefits of the aloe vera plant and it was found out that aloe vera does in fact have several properties that are effective in treating a variety of skin conditions, from flaky or dry skin, cosmetic ailments, hair and scalp problems and many more[6].

3. Effects on Wound Healing

Principally, the wound is defined as a lesion and rupture on skin surface that is caused by physical or thermal trauma, which needs medical therapy. Improvement and healing of wound in human or developed animals occur with a completely complex and advanced mechanism passing through several phases including inflammation, proliferation, healing, and reconstruction[12].Wound healing property is related to a compound that is called glucomannan, which is enriched with polysaccharides like mannose. The glucomannan affects fibroblast growth factor and stimulates the activity and proliferation of these cells and in turn improves collagen production and secretion. The mucilage of aloe vera not only increases amount of collagen on wound site, but also increases transverse connections among these bands rather than creation of change in collagen structure and as a result accelerates wound improvement[13].Results of in vitro studies on the effects of aloe vera on cell proliferation are contradictory. One explanation is that the sap could have cytotoxic activity while the gel might promote cell growth[10].

Wound healing includes the three phases of
a) Thrombosis and inflammation,
b) Proliferation and formation of new tissue, and
c) Tissue retrieval[15].

The paramount cellular signalling events and extracellular matrix activities in healing process are controlled by various types of growth factors including fibroblastic growth factors (FGFs), epidermal growth factors (EGFs), transforming growth factors (TGFs), and insulin-like growth factors (IGFs)[16].The insulin-like growth factors (IGFs) are secreted by few numbers of dermis and epidermis cells in normal skin but during dermal trauma they are secreted by most of epidermal cells including macrophages and platelets[17].Other studies have shown that IGFs along with other factors such as platelet-derived growth factors (PDGFs) play important role in process of wound healing so that they increase the thickness of dermis and epidermis[18,19].

Treatment of wounds is very important and was subject of different investigations.Burning emerges as tissue trauma is caused defined by some factors such as heat, chemicals, electricity, sunlight, and/or nuclear radiation. Most of burns are caused by building fires, boiling water, steam, hot liquids, and flammable gases[20]. The burning caused by heat and accidents and the like is assumed as the foremost cause of mortality and disability in the victims[21].Studies say that, most of the primary treatments including drug topical dosage are employed to prevent against penetration of infectious substances into the wound[14].Several plants are used traditionally in treatment of many skin wounds and burns in various points of the world[22].Aloe vera is widely used as one of the plants with a very long history of healing of skin wounds and burnings.

4. Other Effects of Aloe Vera

Apart from the skin and wound healing effects of aloe vera it also has other effects such as providing nutrition for good health,aids in digestion,on immune system,laxative effects etc.On the immune system,Alprogen inhibit calcium influx into mast cells, thereby inhibiting the antigen-antibody-mediated release of histamine and leukotriene from mast cells[23].Anthraquinones present in latex are a potent laxative. It increases intestinal water content, stimulates mucus secretion and increases intestinal peristalsis[24].As said earlier, Aloe vera contains over 75 different nutrients including vitamins, minerals, enzymes, sugars, anthraquinones or phenolic compounds, lignin, saponins, sterols, amino acids and salicylic acid[6],it also provides nutrition to the body.The plant is said to improve digestion and to relieve ulcers.

5. Side Effects

Aloe vera may cause redness, burning, stinging sensation and rarely generalised dermatitis in sensitive individuals. Allergic reactions are mostly due to anthraquinones, such as aloin and barbaloin[2]. It is advised to apply first to a small area and check for the allergic reactions. If no allergic reactions are seen it can be applied.Oral aloe is not recommended during pregnancy due to theoretical stimulation of uterine contractions, and in breastfeeding mothers, it may sometimes cause gastrointestinal distress in the nursing infant[2].

6. Conclusion

Aloe vera has a wide range of properties and uses which includes many beneficial effects and few unwanted ones. Its effect on skin and wound healing are high lightened in this study.

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